Math 1221: Recitation 9 (T)

Naufil Sakran

(1) Solve the following. **(Do any two of them)**

(a) Comment on the convergence of the following series. Also, find R_{10} for the series and simplify it. *(Recall: $R_n = b_{n+1}$.)*

$$\sum_{n=1}^{\infty}(-1)^{n+1}(\ln(n+1)-\ln(n))$$

(b) Comment on the convergence or divergence of the series using root test.

$$\sum_{n=0}^{\infty}\left(\frac{n}{10(n+1)+3}\right)^n$$

(c) Comment on the convergence or divergence of the series using root test. *(This is our ordinary $\pi \approx 3.142$)*

$$\sum_{n=0}^{\infty}\frac{n^{\pi}}{\pi^n}$$

(2) Solve the following questions. **(Do any two of them)**.

(a) Suppose that $\left|\frac{a_{n+1}}{a_n}\right| \to 1$. Find the radius of convergence of the following series

$$\sum_{n=0}^{\infty}\frac{a_n x^n}{5^n}$$

(b) Use the equation $\frac{1}{1-x} = \sum_{n=0}^{\infty} x^n = 1 + x + x^2 + \cdots$, to expand the following function

$$f(x) = \frac{1}{1+2x}.$$

(c) Apply the ratio test to the series and determine if the series converges or diverges.

$$\sum_{n=1}^{\infty} \frac{n!}{16n^3}$$

(3) **(Bonus)** Solve any **two of them.**

(a) Use the ratio test to determine whether the series converge or diverge.

$$\sum_{n=0}^{\infty} \frac{n^{15}}{4^n}$$

(b) Find the interval of convergence of

$$\sum_{n=0}^{\infty} \frac{x^n}{n^9 + 7}$$

(c) Find the radius of convergence of

$$\sum_{n=1}^{\infty} \frac{(3x)^n}{n}$$